ISSN 0317-2473

Discussion Paper No. 43

FERTILITY ESTIMATES FOR BANGLADESH BASED ON BIRTH HISTORY DATA

By

S.M. Shafiqul Islam

Department of Sociology
The University of Alberta
Edmonton, Alberta, Canada
T6G 2H4

April 1986

ABSTRACT

This paper attempts to estimate the levels and trends in fertility for Bangladesh and to study the effects of various response errors on these estimates using the birth history data from the Bangladesh Fertility Survey, 1975-76. Fertility in Bangladesh remained high up to 1970. A substantial decline in fertility was found to have occurred during the period 1971-75. The observed dip in fertility has reflected the effects of the 1971 war of liberation and the 1974 widespread famine in Bangladesh. This dip in fertility was probably temporary and it may revert to its previous level. The total fertility rate for Bangladesh was estimated to be 5.9 during the period 1971-75. Reported fertility in the 5-10 years before the date of the survey was exaggerated which perhaps could be associated with the errors in the data resulting from the misplacement of events over time. Fertility rates beyond the 15 years preceding the survey were found to be substantially affected by age misreporting, omission and misplacement of events.

Key Words - Lexis diagram, cohort-period fertility

INTRODUCTION

Estimation of the levels and trends in fertility for Bangladesh has been difficult particularly because of the system of vital events registration representative of the whole national population is still non-existent and the data collected from censuses and demographic sample surveys suffer from various reporting errors and misenumeration. Although several studies have attempted to derive estimates of the levels and trends in fertility for Bangladesh using the data from censuses and demographic sample surveys, some of them revealed contradictory results while some of them were of limited value due to the inadequacy of data (e.g., Khan, 1973b; Sirageldin et al., 1975; Chen et al., 1977; Brass and Rashad, 1980, Brass,1981; and Amin and Faruqee, 1980). Moreover, most of the studies are out of date to reflect the changes that have occurred, particularly due to the social disruptions caused by the war of liberation in 1971 and the widespread famine in 1974.

A wide range of techniques have so far been developed in order to estimate fertility levels for countries where demographic data collected from censuses and surveys are deficient or unreliable. These include, for example, stable population technique based on observed age distribution and intercensal growth rate (United Nations, 1967), reverse survival method based on age-sex distribution from two consecutive censuses (United Nations, 1967), Brass technique

using the reports on births during a 12-month period preceding the survey (Brass et al., 1968), own children method using the age distribution of children in the household who are not living away from home (Cho and Feeney, 1978), methods based on model fitting (Coale and Trussell, 1974; Brass, 1975, 1979, 1981), and the method based on birth history data (Bogue and Bogue, 1970; Brass, 1975, 1977, 1979; Potter, 1975, 1977a; and Verma, 1980)

It has been suggested that the retrospective surveys at which birth histories are recorded would not only substitute the traditional systems of obtaining data from a combination of vital events registration and census but would be far superior to the traditional systems which are "...subject to inconsistencies in the classification of flows and stocks by various demographic criteria" (Shryock and Siegel, 1973, p. 832). In the absence of adequate data of traditional type, Brass (1977) has also noted that the retrospective surveys that collect birth histories might be the most promising means for studying the trends in fertility and this approach could be more reliable than the repeated surveys to derive the levels of fertility at different periods of time. He cited an example in the case of Bangladesh where a series of surveys were conducted which failed to provide a definite trend in fertility due to varying amounts of biases in the surveys. Thus the purpose of the present paper is to estimate the levels and trends in fertility for Bangladesh based on the retrospective birth history data collected in a

specially designed national sample survey. Attemps will also be made to study the effects of various response errors on the estimates of fertility derived by employing the direct method of birth history analysis.

MATERIALS AND METHODS

DATA SOURCE

Data for this study were derived from the Bangladesh Fertility Survey which was conducted during 1975-76 under the auspices of the World Fertility Survey. [1] The survey was based on a three-stage sample design of non-institutional households for both the rural and urban strata. A sample was drawn independently in all the three stages. All ever married women below 50 years of age who slept in the household the night preceding the household interview were selected as eligible respondents for the individual interview. Among the successfully interviewed women, 5,024 were from the rural areas and 1,497 from the urban areas. An oversampling in the urban areas was purposely done to obtain a reasonably large sample required for carrying out a separate study for urban women. Sample weights were assigned with a view to allow for this oversampling.[2] In order to obtain the national estimates of fertility, these weights were used.

Details of all pregnancies experienced by the selected women were recorded in a chronological order. A single integrated history of all pregnancies was obtained probing

for pregnancies not resulting in live births in each interval bounded, as appropriate, by marriage and first live birth, first live birth and second live birth, and so on until the open interval. This segmental approach was designed to help the respondents minimize memory lapse and misplacement in the location of events of their reproductive life. Dates of birth of the respondents and their children were imputed in the cases where these were not available in months and years.[3]

TECHNIQUES OF BIRTH HISTORY ANALYSIS

Informations obtained from birth histories can be used to get fertility estimates by transforming these into two matrices, one for the numerator and the other for the denominator. The numerator matrix is formed for each live birth classified simultaneously according to the calendar year in which it occurred and the age of mother at the time of birth. Each row of the matrix indicates one calendar year and each column indicates one year of age of mother. The denominator matrix is formed for each woman classified simultaneously according to the calendar year and the person years by age of women. In the denominator matrix, each row represents one calendar year and each column represents one person year by age of women. Thus from the above two matrices age specific fertility rates can be calculated for a long period (e. g., 35 years if the age of the oldest respondents is 49 years at the time of interview) in the

past. However, as the analysis is extended back into the past, fertility experience is only available for women at young ages. This procedure provides fertility rates both in the cohort and cross-sectional contexts which for conventional five-year periods may be explained with the help of the Lexis diagram (Fig. 1) as follows.

The exact ages of women separated into five-year cohorts determined by age at interview are represented on the vertical axis. Periods before the survey relative to the date of interview in five-year intervals are represented on the horizontal axis. Fertility rates for each cohort of women are allocated to different periods before the date of survey. Thus each cell in the form of parallelogram centered at exact ages 15, 20,.....,50 in the Lexis diagram (Fig. 1) represents fertility rates specific to both the cohort and the period.

Cross-sectional fertility rates over different periods preceding the date of survey can be obtained by reading through the columns. Diagonals give the cohort fertility rates. For example, the uppermost diagonal indicates the fertility rates for the cohort of women aged 45-49 years at the time of interview. To study the change in cross-sectional fertility, different cohorts can be compared for the same age of women at the time of interview. For instance, to examine the change in fertility of women aged 35-39 (age at end of period) in the 15 years before the date

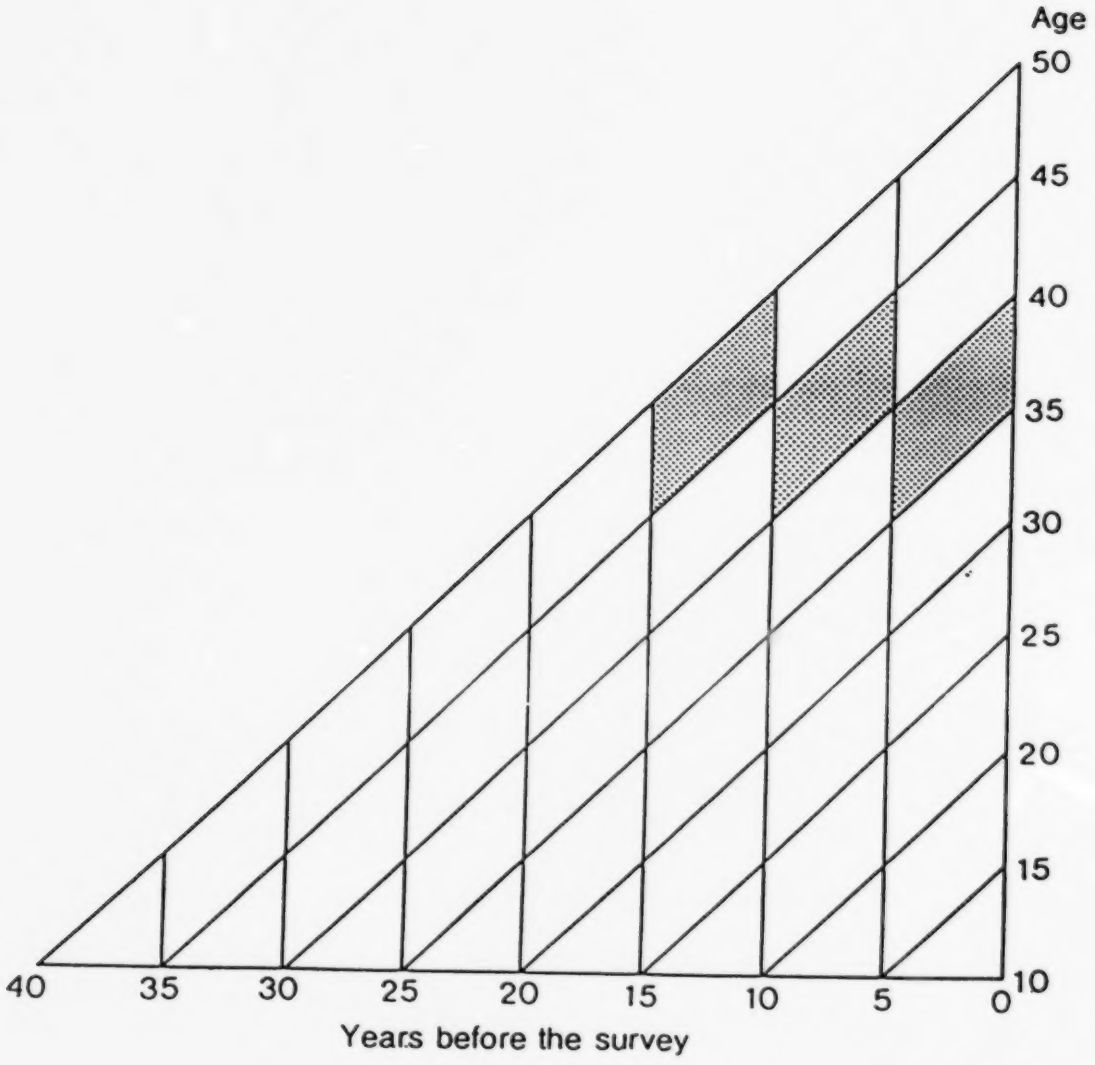


FIG. 1. BIRTH COHORT AND CROSS-SECTIONAL FERTILITY USING THE LEXIS DIAGRAM

Note

Shaded parallelograms to be compared in measuring the change in fertility of women aged 35-39 (age at end of period) in the 15 years before the date of survey.

of survey, the shaded parallelogram in the Lexis diagram (Fig. 1) corresponding to women aged 35-39, 40-44, and 45-49 years at interview in 0-5, 5-10, and 10-15 years respectively before the survey are to be compared. This ability to provide an estimate of the change in fertility over time is the main advantage of birth history analysis (Potter, 1975).

PROBLEMS IN ANALYZING BIRTH HISTORY DATA

Three main problems make it difficult to estimate fertility rates using the birth history data, particularly in developing countries. First, misstatement of current age (or date of birth in months and years) by respondents creates problem in the definition of cohorts and results in the false decline or exaggeration of cohort fertility. If, for example, the cohort of women aged 15-19 at the time of interview includes women beyond age 20 years, the cohort fertility will be spuriously overstated because of the inclusion of larger number of births. Similarly, if the cohort of women aged 30-34 at interview includes a considerable number of women who are actually over 35 years old and none of those below age 30 years, then the fertility rate for the cohort may be underestimated.

Age misstatement also introduces biases in the study of the change in fertility. If all the cohorts of women were subject to similar age misreporting, the consequences in the measurement of fertility change over time would not be so

serious. However, when the two adjacent cohorts are subject to differential age misreporting, the problem arises. For instance, if the women in the two adjacent cohorts between the exact ages 35 and 45 are intermixed as a result of misreporting of age , the older cohort will tend to be younger than its actual age and the younger cohort will be older. Fertility rate for the most recent five-year period for the younger of the two cohorts will be underestimated and the rate for the older of the two cohorts with reported age 40-44 will be overestimated in the period 5-10 years preceding the survey if fertility, in fact, declines after age 30.

Second, a problem in analyzing birth history data arises due to omission of births of children. Available evidence suggests that certain events, such as, children who have died or moved away from home, infants, female and illegitimate children are more likely to be omitted than others from birth histories. As a result, the total number of children ever born is usually understated. Omission of birth is directly related to the time elapsed since the birth of child (Brass, 1979; Potter, 1975). This may be due to memory lapse associated with larger number of births, longer intervals and absences of children through death or migration. The effect of omission of births is largely dependent on the distribution of omitted births by period and by cohort. If, for example, the respondents of all ages have a considerable tendency to omit very young children,

fertility in the most recent period would be underestimated and "the bias would be greater, the shorter the length of the period chosen" (Potter, 1975, p. 6). It is usually suggested that the omission of births is more common among older women. This results in the underestimation of the level of fertility for earlier periods and older cohorts. Consequently, the measurement of the trends in fertility may also be biased by omission of births. This is probably the reason why the birth history analysis is considered as a "conservative evaluation technique" for studying the trends in fertility (Bogue and Bogue, 1970, p. 25). "An unfortunate practice, no doubt related to this reasoning, is that very often analysts do not present results for more than the last 10 years of experience covered in a survey" (Potter, 1977a, p. 337).

A third problem occurs when the dates of births of children are wrongly placed in the different time intervals before the survey. Brass (1979, p. 17) explains this error "in terms of a distortion of the time scale". Some births that are reported to have occurred during a certain year might actually refer to those occurred in a shorter or longer interval (for example, 9 or 15 months). This distortion of time scale is called reference size bias. According to Brass (1979), the level of period fertility would be exaggerated if the reference size bias is longer while the shorter reference size bias will result in the understatement of the level of period fertility. Reference

size bias may also cause a misleading conclusion in studying the trends in fertility between two periods. For example, if an upwards reference size bias in the earlier period is followed by a downwards or zero reference size bias in the latter period, the conclusion of a decline in fertility between the two periods will be false.

Another kind of event misplacement occurs when the bias in the date of birth of child is associated with the age of mother. The older women tend to misplace the date of births of children, putting it further back in time than it actually belongs. This error exaggerates the level of fertility for the earliest period before the survey. Potter (1975) discusses that there is also a tendency among women to misplace the initial event closer to the date of interview and to overstate or understate the length of interval between births. These event misplacement errors depend on whether the birth history questionnaire begins with questions about the earliest event or the most recent event. According to Potter (1975), if the questionnaire begins with the earliest event and the respondents have a tendency to misplace the date of birth of the first child towards the date of interview and exaggerate the length of interval between births, some of the recent births would be pushed into the future, unless a constraint is introduced by interviewers or respondents. On the other hand, if the questionnaire begins with the most recent event and the respondents tend to misallocate it further back in time and

overstate the length of inter-live birth intervals, then this would result in the wrong distribution of first birth at impossibly young ages of respondents. However, a good field work can help minimizing such gross errors in reporting events.

In many developing countries, a considerable proportion of dates of birth of mothers and children cannot be obtained in months and years. A large proportion of respondents report the dates in terms of 'years ago'. These dates are estimated in months and years, either in the field or by imputation when processing the data. This may introduce complicated misplacement errors in the allocation of events over time and may distort the real fertility situation.

RESULTS

CURRENT LEVELS OF FERTILITY

Current levels of fertility can be studied by age specific fertility rates for the period of five-years preceding the survey. Table 1 presents the age specific fertility rates for Bangladesh by single years from 1971 to 1975. In order to minimize the effects of sampling variation and to examine the overall levels of current fertility, five-year average age specific fertility rates for the period 1971-75 were also computed.

The total fertility rate for Bangladesh is found to have declined, though not consistently, from a level of 7.3

TABLE 1

AGE SPECIFIC FERTILITY RATES* FOR BANGLADESH, 1971-75

Age Group	Year					
	1971	1972	1973	1974	1975	1971-75
15-19	0.220	0.190	0.196	0.190	0.194	0.198
20-24	0.368	0.310	0.318	0.301	0.283	0.315
25-29	0.322	0.264	0.286	0.243	0.250	0.271
30-34	0.258	0.213	0.200	0.212	0.181	0.212
35-39	0.196	0.131	0.125	0.108	0.091	0.129
40-44	0.065	0.050	0.049	0.036	0.035	0.046
45-49	0.018#	0.018	0.000	0.015	0.006	0.008
Total Fertility Rate	7.3	5.9	5.9	5.6	5.2	5.9

Source: Birth history data, Bangladesh Fertility Survey, 1975-76.

* Computed by multiplying age specific marital fertility rates for ever married women with the proportion ever married found in the 1974 Bangladesh Population Census.

Assumed to be the same as the corresponding rate for 1972

to 5.2 over the period of five-years from 1971 to 1975 as revealed by the single year rates. The marked decline in fertility in the year 1972 may be explained by a number of factors. The 1971 social disruption caused by the war of liberation presumably influenced some of the intermediate variables, such as, proportion married among females, voluntary or involuntary abstinence, frequency of coitus (see Davis and Blake, 1956) which in turn affected the reproductive performance of couples. During the period of social disruption, the number of persons entering reproductive life might have reduced because of the temporary postponement of marriages. A large exodus of about 16 per cent of the population (Curlin et al., 1976) to neighbouring India as refugees might have contributed to the reduction in conception either by voluntary or involuntary separation of spouses. Due to psychological stress or the desire to postpone pregnancy, coital frequency might have been reduced. Reduction in the number of births in the year 1972 (a year after the war of liberation) presumably reflected the depressing effects of the above intermediate variables on fertility during the period of social disruption.

A similar decline in fertility a year after the period of liberation war was also found from the reasonably complete vital registration data in Matlab Thana (Curlin et al., 1976; Chen and Chowdhury, 1977). Although this finding was limited to a relatively smaller area and might not be

representative of all Bangladesh, it might be taken to support the evidence of the marked decline in fertility a year after the war of liberation.

The post-conflict 'compensatory' rise in fertility was found in Matlab Thana in 1973 resulting from the desire to replace the lost children and to make up for the postponed marriages (Chen and Chowdhury, 1977). However, the present study does not show such a rise in fertility. Event misplacement in birth history data produces an exaggerated decline towards the date of survey (Potter, 1977a). This is found to be more pronounced a year before the date of survey (e. g., McDonald et al., 1976; Asare, 1980). The apparent decline in fertility in Bangladesh in the year 1974 may possibly be accounted for by this.

The 1974 famine in Bangladesh resulting from the severe monsoon flooding which caused almost total crop failure of the major annual rice harvest might have decreased the nutritional status of a vast majority of women. Maternal malnutrition has resulted in the reduction in fecundity and lengthened the period of temperory infertility (Chowdhury and Curlin, 1979). These biological factors might have contributed to the highest decline in fertility in the year 1975. Chen and Chowdhury (1977) also found a sharp decline in fertility in Matlab Thana a year after the 1974 famine which may be taken to support the decline in fertility in Bangladesh in the year 1975.

The total fertility rate for Bangladesh during the period 1971-75 is found to be 5.9 which is not out of line with that of 6.3 (longitudinal registration estimate) in 1963-65 obtained from the Population Growth Estimation Experiment (Farooqui and Farooq, 1971) and of 6.0 in 1966-68 derived from the National Impact Survey data (Sirageldin et al., 1975). However, the estimate of the total fertility for the year 1974 in this study is considerably lower than that obtained from the 1974 Bangladesh Retrospective Survey of Fertility and Mortality using the Coale-Trussell (1974) fertility model based on the assumption of constant fertility in the past (Census Commission, 1977). This assumption though generally valid for Bangladesh might be less realistic for recent years (Bangladesh, 1978).

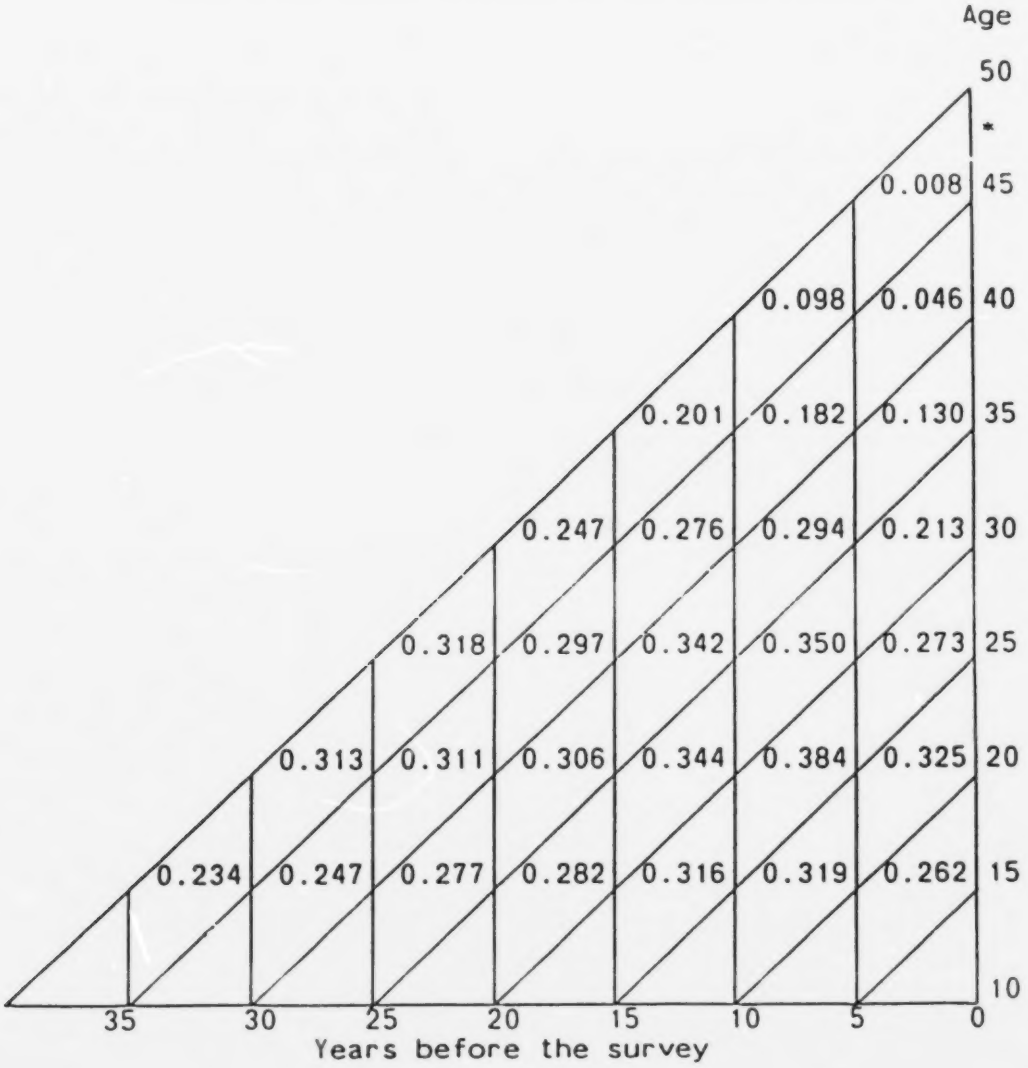
TRENDS IN FERTILITY

Age specific marital fertility rates for ever married women are used to study the trends in fertility. These rates for Bangladesh in five-year periods for the 35 years preceding the date of survey are presented in Table 2. The table provides both the cross-sectional and cohort fertility rates as explained earlier.

The cross-sectional marital fertility rates in all age groups of women have shown a sharp decline in the period 0-5 years before the survey. Table 2 also shows that the cross-sectional marital fertility rates were the highest except for the women aged 35-39 years at interview during

TABLE 2

AGE COHORT AND CROSS-SECTIONAL MARITAL FERTILITY RATES FOR EVER MARRIED WOMEN IN BANGLADESH



Source: Birth history data, Bangladesh Fertility Survey, 1975-76.

* Age specific fertility rates for the oldest age cohort (aged 45-49 at the time of interview) are based on 4 year average.

the period 5-10 years before the survey. Probably due to reporting errors, the cross-sectional fertility for ever married women do not reveal a clear time trend, particularly beyond the 15 years preceding the survey. The cohort aged 40-44 at interview (women born in the period 1931-35) had the lowest fertility in all age groups except for the age groups 30-34 during the period 5 to 25 years before the survey. This feature seems to be implausible as there is no external evidence that fertility contributed partly by this cohort of ever married women was lower in the period 5 to 25 years prior to the survey. The older the cohort the higher the marital fertility was found only in the cases of the cohorts aged 35-39 and 40-44 years at interview for the three oldest cohorts (aged 45-49, 40-44, and 35-39 at interview).

A comparison of adjacent age cohorts to detect the change in marital fertility reveals that in the 25 years before the date of survey the women in the age group 15-19 belonging to the youngest cohort (aged 15-19 at interview) have experienced a lower fertility. For other cohorts in the age group 15-19, the older the cohort the lower the fertility. This feature appears to be quite contradictory to what one would expect.

The total marital fertility rate for ever married women aged 15-44 years for the 1926-30 birth cohort (aged 45-49 years at interview) was 7.1 while that for the 1931-35 birth

cohort (aged 40-44 years at interview) was 6.8. The total marital fertility rates for both the cohorts compare well with the mean parity 6.9 for women aged 40-44 years at the time of interview. On the other hand, the cross-sectional total marital fertility rate for the period 1971-75 was found to be 6.2 per ever married women aged 15-44 years, where as the rate for the period 1966-70 was 8.1. The cross-sectional total marital fertility rate for the period 1966-70 appears to be an over-estimate of the actual fertility situation. This may be explained by the tendency of pushing earlier births forward or the most recent births backwards in the time scale prior to the date of survey.

AGE PATTERNS OF FERTILITY

The age curves of fertility for Bangladesh from various nationally representative sources are plotted in Fig. 2. With the exception of the two fertility schedules obtained from the Population Growth Estimation (PGE) Experiment, all the fertility schedules follow the United Nations' (1963) 'early peak' pattern.[4] The shape of the fertility schedule drawn from the Bangladesh Fertility Survey data and the National Impact Survey data was found to be almost similar except for the age group 15-19. It may be pointed out that both the surveys used birth history data. The discrepancy in the age group 15-19 may be explained in part by the proportion married employed in the two surveys.

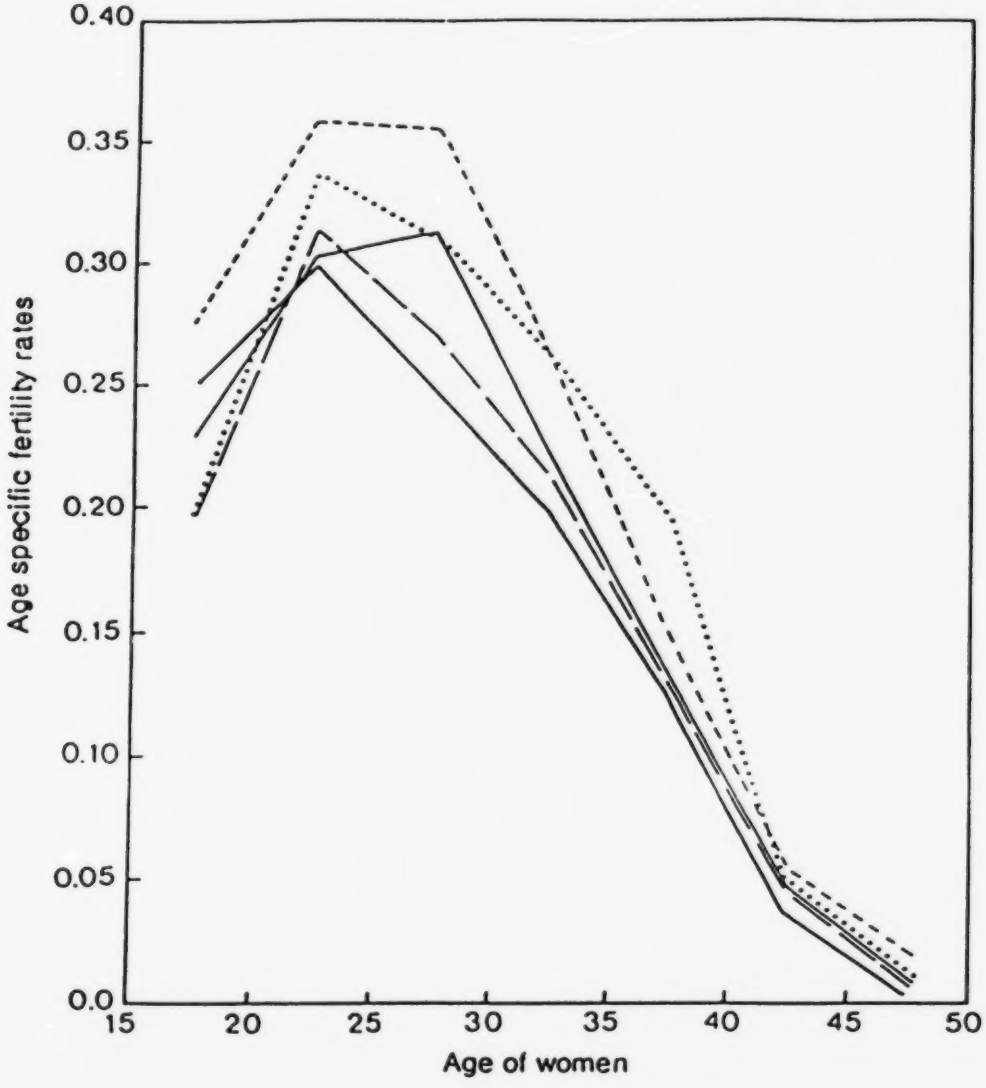


FIG. 2. AGE CURVES OF FERTILITY FOR BANGLADESH

Legend

——— Bangladesh fertility survey (1971-75)

····· Retrospective survey (1974)

——— National impact survey (1966-68)

——— PGE experiment: LR estimate (1963-65)

------ PGE experiment: C-D estimate (1963-65)

The fertility curve drawn from the Bangladesh Retrospective Survey of Fertility and Mortality has tapered off abruptly from the age group 25-29 and has depicted an 'older'fertility schedule. On the other hand, the Chandrasekar-Deming estimate from the Population Growth Estimation Experiment has demonstrated a 'younger' fertility schedule. Thus it appears that different estimation procedures employed in various surveys, confounded by the differential inaccuracy of data, might have caused differences in the shape of the age curves of fertility in Bangladesh.

EFFECTS OF REPORTING ERRORS ON FERTILITY ESTIMATES

In Bangladesh where a vast majority of the respondents are not calendar year conscious and are even ignorant of their own date of birth, ' fertility estimates derived from birth history data are likely to suffer from various errors. Until now, no direct method of detecting the effects of various response errors on fertility estimates is available. The alternative is to inspect the observed fertility rates for apparent distortions in light of available evidence. Internal consistency checks are also sometimes helpful. In addition to response errors, it is suspected that the observed fertility rates might have been affected by the procedure of imputing the dates of birth of a vast majority of respondents and their children that were not reported in calendar years and months.

According to Potter (1977b), fertility rates for various age cohorts of women in the age group 15-19 are sensitive to age at first marriage, age misreporting, omissions and event misplacement. It was pointed out earlier that in the age group 15-19 corresponding to various age cohorts of women other than the youngest cohort (aged 15-19 years at interview), the older the cohort the lower was the fertility in Bangladesh. As there is the evidence of slightly declining age at marriage in Bangladesh during the 35 years before the survey (Bangladesh, 1978), one would normally expect that the fertility rates for various age cohorts in the age group 15-19 would be higher for the older cohort. The contradictory situation observed for all age cohorts other than the youngest cohort in Bangladesh indicates that a substantial amount of response errors have crept into data on fertility. Effects of omission of births may be examined from the observed fertility rates, particularly for the older age cohorts of women. The cohort of women born in the period 1931-35 (aged 40-44 years at interview) generally reported lower fertility rates as compared to those reported by other age cohorts of women (Table 2). This provides evidence of a substantial omission of births by older women. Age misreporting and event misplacement among older women might also partly account for the reported lower fertility.

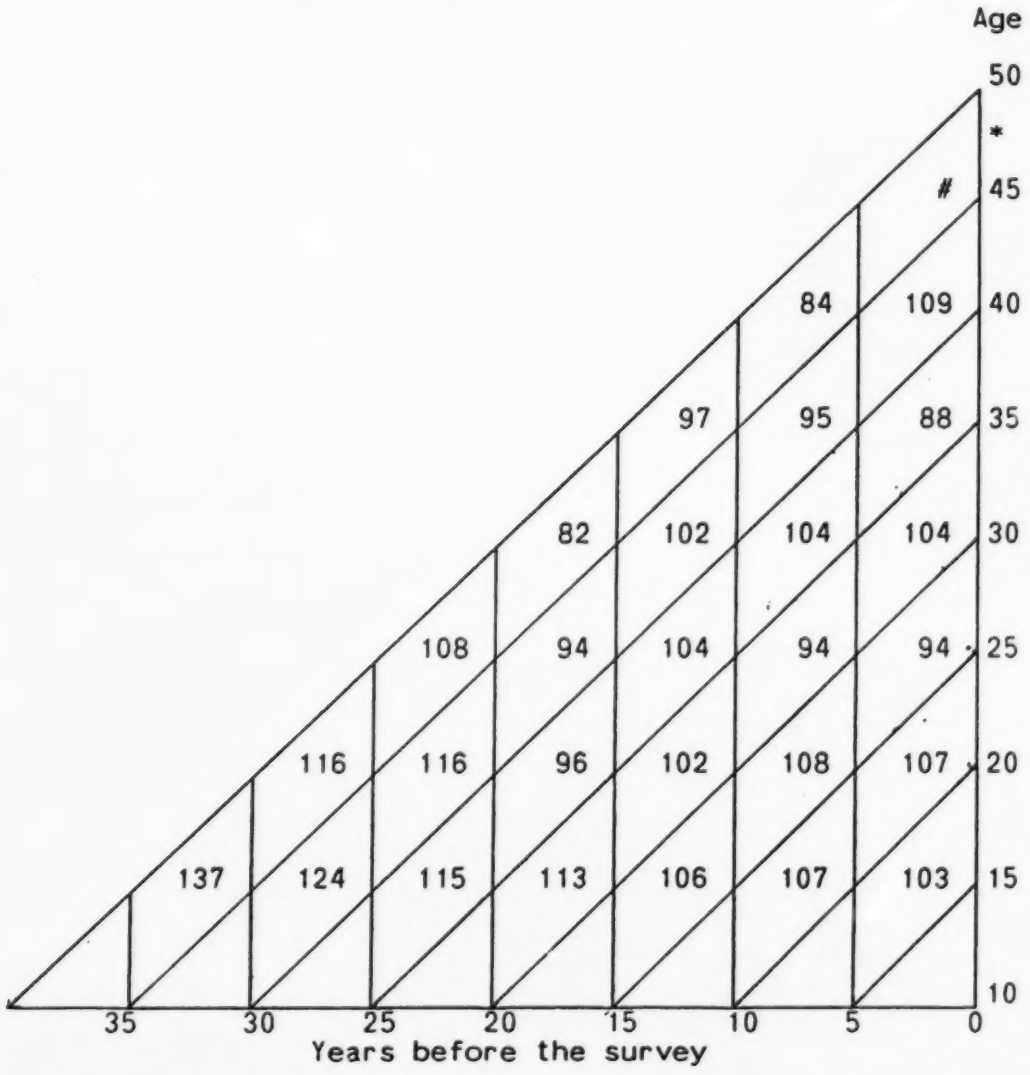
One of the internal consistency checks for the possible effects of the response errors on the observed fertility

rates is to examine the patterns of the reported sex ratio at birth. It is often suggested that male births are better remembered than female births and this has been particularly observed in the case of Bangladesh where the prevalence of a patriarchal system places a high value on males than females (Rukanuddin, 1967). Thus there may be some sex selectiveness in the reporting of births. Some time trend in the sex ratio of reported births might be expected if the reporting is associated with the length of the recall period (Sirageldin et al., 1975). According to Rukanuddin (1967), the sex ratio at birth per 100 females is expected to lie in the range 102-107. A study of the reported sex ratio at birth by various age cohorts of women might focus on the possible effects of response errors on the observed fertility rates. The reported sex ratios at birth per 100 females for various age cohorts of women in the age group 15-19 have shown a clear time trend beyond the period 15 years before the survey (Table 3). This is indicative of possible underreporting of female births in the early years of childbearing. The reported sex ratios at birth have shown marked deviations from the expected range of 102-107 births per 100 females with few exceptions for various age cohorts of women. Misplacement of births over time might also be attributed to the observed patterns of sex ratios at birth.

Event misplacement in the form of pushing the earlier births forward and the recent births backward over time affects the fertility rates derived from birth histories. If

TABLE 3

SEX RATIO AT BIRTH PER 100 FEMALES BY AGE OF MOTHER AND YEARS BEFORE THE SURVEY IN BANGLADESH



Source: Birth history data, Bangladesh Fertility Survey, 1975-76.
Less than 30 births.
* Sex ratios for the oldest age cohort (aged 45-49 at interview) are based on 4 year average.

such misplacement of live births should occur, the cross-sectional fertility rates in the most recent period (0-5 years before the survey) would be understated and the rates corresponding to the period 5-10 years prior to the survey would be inflated (Cain et al., 1979; Brass and Rashad, 1980). A decline in cross-sectional fertility in the period 0-5 years before the survey and an apparent overstatement of fertility in the period 5-10 years preceding the survey (Table 2) indicate the existence of event misplacement errors. However, as discussed earlier, there might have been a fertility decline in Bangladesh during the five-year period immediately preceding the survey due to the social disruptions caused by the liberation war in 1971 and the 1974 widespread famine. A gradual decline in the proportion of ever married women in Bangladesh (see Bangladesh, 1978), particularly before age 20 might also contribute to a reduction in fertility in the 0-5 years before the survey. There has been no evidence of a substantial fertility decline in Bangladesh during the 1940's' and 1950's. The observed lower cross-sectional marital fertility rates, in general, corresponding to the different five-year periods beyond the 15 years preceding the survey indicate that these rates were affected by errors due to omission of births, misreporting the age of mothers and misplacement of births over time.

Brass and Rashad (1980) have applied the P/F ratio method and the Gompertz relational model with a view to

detect errors and to adjust fertility rates derived by using the birth history data from the Bangladesh Fertility Survey, 1975-76. They have also found that the fertility rates for Bangladesh were affected by a substantial amount of various reporting errors. Applying the P/F ratio method and Gompertz relational model, Brass and Rashad (1980) found the adjusted total fertility rates for Bangladesh for the period 1971-75 to be 7.5 and 7.4 respectively. Again, Brass (1981) applying the Gompertz relational model to the same set of data with a slightly modified fitting procedure adjusted the total fertility rates for Bangladesh for the periods 1961-65, 1966-70, and 1971-75 to be 7.4, 7.3, and 6.8 respectively. However, Brass (1981) has observed from the fitted model that the births in the period five to fifteen years prior to the survey were over-reported and those in the past five years were modestly under-reported. He has also noted that the fertility decline in the five years preceding the date of survey has occurred among young women, possibly as a result of a rising age at marriage and the decline might have been temporary because of famine conditions.

SUMMARY AND CONCLUSIONS

Fertility in Bangladesh is found to have declined substantially during the period 1971-75. The social disruptions caused by the 1971 war of liberation and the widespread famine in 1974 might have been the reasons for this decline. However, the observed dip in the levels of

fertility might probably be only temporary and fertility might revert to its previous roughly constant trend (Amin and Faruqee, 1980). Evidence from the former Cholera Research Laboratory vital registration data in Matlab Thana has indicated that the total fertility rate has been increasing since the year 1975. ' It was observed that fertility in the period 5-10 years before the survey (1966-70) was somewhat exaggerated, a feature mainly associated with the misplacement of earlier births forward and the recent birth backward in time while reporting the events. Observed fertility rates beyond 15 years prior to the date of survey have been very doubtful because the birth history data in the relatively distant past are more likely to be affected by various response errors, especially omission and misplacement of events. Interviewing the respondents from the most recent to the earliest event for collecting birth history data as suggested by Potter (1977a, p. 364) "...would minimize the potential for distorting recent trends in fertility".

The observed national estimate of total fertility rate of 5.9 for the period 1971-75 derived in the present study, which agrees closely with that of 6.2 (unadjusted) obtained by Rodriguez and Cleland (1980) for the same period of time and using the same source of data, was about 15 and 27 per cent lower than the corresponding estimate found by the application of the Gompertz relational model and the P/F ratio method respectively. It seems that the adjustment

procedures probably have provided a satisfactory representation of trends but not of levels of fertility in Bangladesh where the response errors have affected the data substantially. Brass (1980) was also doubtful about the levels of fertility during the period 1971-75 as obtained by applying the adjustment procedures.

Finally, it was realized that the birth history data used in this study were not well-reported and well-imputed. This has caused some distortions in the levels and trends in fertility. Nevertheless, this study has provided a fair idea about the levels and trends in fertility in Bangladesh. It may be suggested that in a country like Bangladesh, where a vast majority of women (respondents) are not calendar year conscious, the birth history data should be carefully edited for any discrepancies before analysis. It may also be suggested that the analysis of fertility from birth history data for a developing country like Bangladesh should not extend beyond the 15 years before the date of survey. Further research should be carried out to study the possible effects and interactions of various response errors on the estimates of fertility.

ACKNOWLEDGEMENTS

This paper is based on the author's M. A. thesis submitted at the Australian National University, Canberra, Australia. An earlier version of this paper was presented at the annual meeting of the Canadian Population Society,

Vancouver, Canada, June, 1983. The author is grateful to Professors P. Krishnan, Wayne W. McVey Jr, and Dr. N.M. Lalu of the University of Alberta, Edmonton, Canada for their critical review of an earlier draft and helpful suggestions.

FOOTNOTES

[1]For an elaborate description of the data collection procedure and some basic analysis of data, see Bangladesh (1978).

[2]Weights assigned to the rural and urban samples were 1.194 and 0.347 respectively (Bangladesh, 1978, p. 31).

[3]For the procedure of imputation, see Bangladesh (1978)

[4]Maximum fertility at age group 20-24.

[5]About 99 and 88 per cent of respondents of the Bangladesh Fertility Survey, 1975-76 could not report their own date of birth and the dates of birth of their children respectively in calendar years and months (WFS/Tech. 1065, p. 3; Chidambaram et al., 1980, p. 31).

[6]There was a slight fertility decline in Bangladesh during the 1940's due to the 1943 Bengal famine (Khan, 1973a).

[7]Total fertility rate for Matlab Thana were found to be 4.3, 6.2, and 6.7 in the years 1975, 1976, and 1977 respectively (Ruzicka and Chowdhury, 1978a, p. 9; Ruzicka and Chowdhury, 1978b, p. 9; Samad et al. n. d., p. 20).

REFERENCES

AMIN, R., and R. FARUQEE.1980. Fertility and its regulations in Bangladesh. Populations and Human Resources Division. The World bank, Washington D. C.

ASARE, K. A. 1980. Estimating fertility and childhood mortality for the western region of Ghana from pregnancy history data. Unpublished M. A. thesis. The Australian National University, Canberra.

BANGLADESH, PCFP DIVISION. 1978. World fertility survey: Bangladesh fertility survey. Ministry of Health and Population Control, Government of the People's Republic of Bangladeh, Dhaka.

BOGUE, D. J., and E. J. BOGUE. 1970. Techniques of pregnancy history analysis. Community and family study center, University of Chicago, Chicago.

BRASS,W. 1975. Methods of estimating fertility and mortality from limited and defective data. Laboratories for Population Statistics. The University of North Carolina, Chapel Hill, N. C.

_____. 1977. The assessment of the validity of fertility trend estimates from maternity histories. International Population Conference, Mexico. Vol. 1. International Union for the Scientific Study of Population.

_____. 1979. Sreening procedure for detecting errors in maternity history data. Regional Workshop on Techniques of Analysis of World Fertility Data: Report and selected papers. United Nations, Economic and Social Commission for Asia and the Pacific, Bangkok.

_____. 1980. Birth history analysis. World fertility conference 1980 : Record of proceedings. Vol. 3. London, July 7-11.

_____. 1981.The use of Gompertz relational model to estimate fertility. International Population Conference, Manila. Vol. 3. International Union for the Scientific Study of Population.

BRASS, W. et al. 1968. The demography of tropical Africa, Princeton University Press, Princeton.

BRASS, W., and H. RASHAD. 1980. Exploratory demographic analysis of imperfect maternity histories to determine levels and trends of fertility. Paper presented at the Seminar on the Analysis of Maternity Histories. London, April 9-11.

CAIN, M. T., D. NORRIS, and I. SIRAGELDIN. 1979. Pre-independence levels of fertility: Evidence from the Pakistan national family planning impact survey, 1968-69, p. 1-9.In M. Hossain et al.(eds.), Fertility in Bangladesh: Which way is it going? National Institute of Population Research and Training, Dhaka.

CENSUS COMMISSION. 1977. Report on the 1974 Bangladesh retrospective survey of fertility and mortality. Statistics Division, Government of the People's Republic of Bangladesh, Dhaka.

CHEN, L. C., and A. K. M. A. CHOWDHURY.1977. The dynamics of contemporary famine. International Population Conference, Mexico. Vol. 1. International Union for the Scientific Study of Population.

CHIDAMBARAM, V.C., J.G. CLELAND, N.GOLDMAN, and S. RUTSTEIN. 1980. An assessment of the quality of WFS demographic data. Paper presented at the Seminar on the Analysis of Maternity Histories. London, April 9-11.

CHO, Lee-Jay and G. FEENEY.1978. Fertility estimation by the own-children method: a methodological elaboration. Lobaratories for Population Statistics. Reprint series no. 20.

CHOWDHURY, A.K.M.A., and G.T. CURLIN. 1979. Recent trends in fertility and mortality in a rural Bangladesh, p. 110-119. In M. Hossain et al. (eds.) Fertility in Bangladesh: Which way is it going? National Institute of Population Research and Training, Dhaka.

COALE, A. J., and T. J. TRUSSELL. 1974. Model fertility schedules: variations in the age structure of childbearing in human populations. Population Index.40(2): 185-258.

CURLIN, G. T., L. C. CHEN, and S. B. HOSSAIN. 1976. Demographic crisis: the impact of the Bangldesh civil war (1971) on births and deaths in a rural area of Bangladesh. Population Studies. 30(1): 87-105.

DAVIS, K. and J, BLAKE.1956. Social structure and fertility: an analytical framework. Economic Development and Social Change. 4(4): 211-235.

FAROOQUI, M. N. I., and G. M. FAROOQ. 1971. Final report of the population growth estimation experiment, 1962-65. Pakistan Institute of Development Economics, Dhaka.

KHAN, M. R. 1973a. Demographic profile of Bangladesh. Proceedings of the Seminar on Family Planning. Bangladesh Government Press, Dhaka.

_____. 1973b. Bangladesh population during the first five year plan period (1973-1978): an estimate. The Bangladesh Economic Review. 1(2): 186-198.

McDONALD, P. F., M. Yasin, and G. W. JONES. 1976. Levels and trends in fertility and childhood mortality in Indonesia. Lembaga Demografi, Facultus Economi, Universitus Indonesia, Jakarta.

POTTER, J. E. 1975. The validity of measuring change in fertility by analysing birth histories obtained in surveys. University Microfilms International. Ann Arbor, Michigan.

_____ .1977a. Problems in using birth history analysis to estimate trends in fertility. Population Studies, 31(2): 335-364.

_____ . 1977b. Methods of detecting errors in world fertility survey data: an application to the Fiji fertility survey. International Population Conference, Mexico. Vol. 1. International Union for the Scientific Study of Population.

RODRIGUEZ, G., and J. CLELAND. 1980. Socio-economic determinants of marital fertility in twenty countries: a multivariate analysis. World Fertility Conference 1980: Record of proceedings. Vol. 2. London, July 7-11.

RUKANUDDIN, A. R. 1967. A study of sex ratio in Pakistan, p. 139-225. In W. C. Robinson (ed.) Studies in the Demography of Pakistan. Pakistan Institute of Development Economics, Karachi.

RUZICKA, L. T., and A. K. M. A. CHOWDHURY.1978a. Demographic surveillance system -Matlab: vital events and migration -1975. Vol. 4. Cholera Research Laboratory, Dhaka.

_____. 1978b. Demographic surveillance system -Matlab: vital events, migration and marriages -1976. Vol. 5. Cholera Research Laboratory, Dhaka.

SAMAD, A., K.SHEIKH, A.M.SARDAR, S.BECKER,and L.C.CHEN. n.d. Demographic surveillance system- Matlab: Vital events and migration- 1977. Draft report. Vol. 6. International Centre for Diarrhoeal Disease Research, Dhaka.

SHRYOCK, H. S., J. S. SIEGEL, and Associates. 1973. The methods and materials of demography. Vol. 2. U. S. Bureau of Census, Washington.

SIRAGELDIN, I., D. NORRIS, and M. AHMAD. 1975. Fertility in Bangladesh : facts and fancies. Population Studies. 29(2): 207-215.

UNITED NATIONS. 1963. Population bulletin of the United Nations. No. 7. Department of Economic and Social Affairs, New York.

_____. 1967. Methods of estimating basic demographic measures from incomplete data: manual 4. Population studies no. 42. New York.

VERMA, V. 1980. Basic fertility measures from retrospective birth histories. WFS/Tech. 1407. International Statistical Institute, The Hague.

WFS/TECH. 1979. Bangladesh standard recode file. Data file documentation series. World Fertility Survey. International Statistical Institute, The Hague. Unpublished.

DISCUSSION PAPER SERIES

NO.

30. Lotka Distribution for a Finite Mixture of Human Populations I
P. Krishnan and N.M. Lalu. September 1982.

31. Population Growth and Stability in Alberta Hinterland Boom-Towns
John W. Gartrell and Harvey Krahn. November 1982.

*32. Housing Change and Perceived Housing Quality in a Northern Alberta Boom-Town
John W. Gartrell and Harvey Krahn. February 1983.

*33. Rapid Growth and Social Disruption: Health and Well-Being in Ten Communities
John W. Gartrell. July 1983.

34. Socioeconomic Development, Medical Care and Nutrition as Determinants of Infant Mortality in Less Developed Countries
J. Jayachandran and George K. Jarvis, November 1983.

35. Interrelation Between Fertility and Non-Economic Characteristics in India: Results from a Log-Linear Model
P. Krishnan. April 1984.

36. Life Tables by Causes of Death, Canada 1975-1977
V. Cheung, R. Kapoor, E. Ng, N. Lalu, and P. Krishnan. August 1984.

37. Determinants of Fertility in Two Canadian Populations: A Causal Modeling Approach.
J. Jayachandran. December 1984.

38. Mortality Differences Among the Indigenous Populations of French and British Origin, and the Aboriginal Population of Canada, 1950-52 to 1970-72.
Frank Trovato. February 1985.

39. The Relationship Between Migration and the Provincial Divorce Rate in Canada, 1971 and 1978: A Reassessment.
Frank Trovato. February 1985.

40. Interprovincial Migration and Suicide in Canada, 1971 - 1978.
Frank Trovato. May 1985.

41. Economic Status of Immigrant Women at Age 30, Canada, 1981.
Carl F. Grindstaff and Frank Trovato. June 1985.

42. The Effects of Marital Dissolution on Suicide: The Canadian Case.
Frank Trovato. June 1985.

* Out of Print